A Common Definition for All Particles in Nature*

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This paper focuses on a new approach to the unification of current physics. It defines 'particles' as discrete integer parts (or quanta) of Nature, with scale-specific intrinsic quantization of all parameter magnitudes. It seeks a single expression for all micro and macro scales of particles in Nature (in an inertial state). By proceeding stepwise, with de Broglie's wave-corpuscular relationship, and with two new postulates, it defines a total of ten common, intrinsic and co-existing common-internal-parameters in all those scales of particles. Each of those ten possesses its definite scale-specific-intrinsic quantization in magnitude, as well as some obvious interrelationships among them all. Hence a few new constants are derived, the defined magnitudes of which appear universally unchanged over all scales of particles. We find: **1)** a common expression for all those scales of particles in Nature; **2)** Nature appears discrete but deterministic – instead of probabilistic; **3)** Planck's constant, as well as the constant that stands for inertial speed of light, wave or photon, appear as local constants (*i.e.* their constancies restricted only to a particular scale of particles); **4)** inertial motions of some scales of particles in Nature should have greater values than inertial speed of light wave or photon, with non-negative values in their traveling time; **v)** the whole of Nature appears physically 10-dimensional (3 space + 1 time + 1 inertial-mass + 3 anti-space + 1 anti-time + 1 inertial-motion), instead of only 4-dimensional (3 space + 1 time).

Keywords: Wave-corpuscular-phenomena, scale-specific-quantization, common-internal-parameters, constant–inertial-momentum, mirror-imaged unfolded (5+5) dimensions

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1. Introduction

Nature appears to be composed of 'massive bodies' or 'system-of-particles' or, more simply, 'particles' (P's) or wave-corpuscular phenomena (WCP). The exact count of P's in Nature is unknown. But all those similar P's in Nature are always observed to exist in their respective intrinsic *scales*, or classes, from micro to macro, or *vice versa*. For example, in Nature, macro to micro scales may be such as: a particular astronomical system of massive bodies with scale-specific mass, molecules of a particular type with a specific mass, atoms of a particular element with a particular mass, the protons in a particular energy level, electrons in a specific element's ground state, gamma-ray-photons with a specific wavelength or energy, visible-light photons with a specific wavelength or energy, microwave-photons with a specific wavelength or energy, and so on. Then any of those specific class or scale actually defines all identical P's that coexist and spread all over Nature. The whole of Nature is a combination of all those 'micro' to 'macro' scales or classes of P's. The 'whole Universe' is conceptually the 'macro-most scale' among all other scales of P's *within* that Nature**.**

Current physics is broadly divided into two mechanics, quantum and relativistic, to deal comfortably with those micro and macro scales of P's. So, the basic mechanisms adopted in each of these micro and macro mechanics seem to be basically 'incomplete', and so unable to offer any common expression for all these micro and macro scales of P's in Nature.

However, it is also well known that every micro scale of P's has an intrinsic property of quantum discreteness in its magnitudes, and that every macro scale of P's is nothing but the composition of definite, but scale-specific, numbers of any such micro scales of P's with their same intrinsic property of quantum discreteness. Then, conceptually, every such macro scale of P's, as a whole, should also have a similar kind to the intrinsic property of quantum discreteness in their magnitudes, no matter whether such quantum magnitudes are properly measured or not. That is, such an intrinsic-property-of-quantum-discreteness must be considered as a *universally-common-internal-property* in all micro to macro scales of P's in Nature.

Current physics also suggests that each of these P's in Nature, irrespective of its scale, is internally composed of some common *constituent parameters,* or say common internal parameters (CIP's), like inertial-mass m, de Broglie's wavelength λ, and so on. It is now also a well-known phenomenon that each of those CIP's possess their corresponding *scale-specific-intrinsic-quantization (or discreteness) in magnitudes* in all P's. In fact, such universally common intrinsic-property-of-quantum-discreteness, in all micro to macro scales of P's in Nature, originates, due to the presence of corresponding scale-specific internal-property-of-quantum-discrete magnitudes of all those CIP's in all same P's.

Current observations also show that such scale-specific intrinsic quantization in magnitude of any particular CIP in a P is a quantity or a number that appears as an *observer-independent* universal 'constant' for that particular scale of P's. For example, the mass of any normal hydrogen atom is an identical or constant quantity. But, that constant quantity defines an intrinsic mass only with respect to a normal hydrogen atom, and not with respect to other scales of P's in Nature. That is, intrinsic mass of the normal hydrogen atom as a CIP can be considered as a "*scale-specific-universal-constant*" (SSUC), rather than any "*universal-constant*"(UC) irrespective of every micro to macro scale of P's in Nature.

Sects. 2 – 8 identify those CIP's with their properties of scale-specific-intrinsic-quantization in magnitudes (as corresponding SSUC's) through two new postulates, and respective universal interrelationships and resulting UC's to deduce later a common expression for all scales of P's in Nature. Sect. 9 includes all the CIP's into two mirror image sets, respectively left and right handed. Sect. 10 derives a common outcome expression for all scales of P's, and evolves some other consequences from all those interrelationships between CIP's. Sect. 11 gives some approximate magnitudes for the series of UC's derived from the interrelationships of CIP's. Finally, Sect. 12 gives some inferences.

2. Fundamentals: Quantized Common Parameters in All Particles

All the quantized Common-Parameters, or CIP's, are described as the fundamental common constituents for all P's irrespective of scales in Nature in the sub-sections below.

2.1 Inertial Mass and de Broglie's Wavelength

The de Broglie's wave-corpuscular relation, for all scales of P's, defines that the m and λ are both CIP's in all scales of P's in Nature, and conceptually

$$m\lambda = h / c \tag{1}$$

is a very well accepted interrelationship. Eq. (1) is also an inverse relation in-between m & λ and for convenience we can also write the same for all scales of P's as

$$m\lambda = h / c = k_1 \tag{2}$$

where k_1 should be a UC and possesses a magnitude that appears identical for all those micro to macro scales of P's in Nature. On the other hand, unlike k_1, the m and λ, as CIP's, have 'scale-specific-intrinsic-quantization in magnitudes' in all scales of P's; hence both m and λ will be the SSUC's. That is, more precisely in terms of universal-constancies in magnitudes, k_1 has a magnitude that is both identical and observer independent for all scales of P's in Nature. The m and λ, as two CIP's as well as SSUC's, both have magnitudes that are not identical, but are observer-independent for all scales of P's in Nature. However, if the unit of h is considered in gm-cm^2/sec instead of erg/sec for conveniences, and the unit for c in cm/sec, then the unit of k_1 in Eq. (2) will be gm-cm.

2.2 Inertial Motion

In both relativistic and quantum mechanics, it has been well considered, that, in inertial state, every known scale of P's is associated with some 'motion' (v). But all such notions of motion appear to us in some scales as a kind of 'scale-specific-intrinsic-quantization in magnitude', and in some other scales, in contrary, merely as a concept of 'relative motion'.

But to include the v in the list of CIP's in all scales of P's in Nature, as we already have the m and λ in Sect. 2.1, that v should have appeared as a 'scale-specific-intrinsic-quantization in magnitudes' in every micro to macro scale of same P's in Nature. In micro scales, particularly in the scale of photons, that v (*i.e.* the speed of light c in inertial state) is a very well known inertial motion for photons; *i.e.* $v = c$, is nothing but a 'scale-specific-intrinsic-quantization in magnitude' for those photons only.

But in the domains of macro scales of P's, the concept of such 'scale-specific-intrinsic-quantization in magnitudes' of v seems to be meaningless. Historically, the concept of relativity showed that the mostly macro scales of P's in our observable or astronomical surroundings are all moving in 'relative motions' with respect to each other. But it is also known that all of those macro scales are ultimately formed by the certain arrangements of various micro scales of P's, including photons. So it is logical that there can also be such respective 'scale-specific-intrinsic-quantization in magnitudes' of v for all those macro scales, if all those same macro scales are also possessed an intrinsic-property-of-quantum-discreteness in their specific scales. However, the 'scale-specific-intrinsic-quantization in magnitudes' of v for all those macro scales is not yet accurately measured. But it may be also possible that there is no proper mechanism to measure any such 'scale-specific-intrinsic-quantization in magnitudes' for v in all those macro scales.

In this context, it appears that, in Special Relativity Theory (SRT), the concept of 'scale-specific-intrinsic-quantization in magnitudes' in inertial motion *i.e.* $v = c$ for photons was first introduced to universalize all those 'relative motions' of macro scales of P's respect to c. Not only that, in SRT, the $v = c$ is also well postulated as a magnitude which is an 'observer-independent' constant. That is, according to SRT, the $v = c$ can be considered as a 'scale-specific-intrinsic-quantization in magnitudes' as well as an "observer independent" constant for a scale of photons. Hence, the c with respect to a specific scale of photons has a property of SSUC, as we already have in Sect. 2.1 for the m and λ as two particular CIP's.

Now we have to ascertain first, whether other micro scales of P's, except a specific scale of photons, are also possessed such kind of 'scale-specific-intrinsic-quantization in magnitudes' in their v and later to find out the same for the macro scales also. Let start first see the magnitudes of v in the various wavelengths or λ of photons on the electromagnetic spectrum (EMS).

3. Inertial Motion of Photons

All photons on the whole EMS with wavelengths corresponding to different scales of WCP's according to Eq. (2) are possessed two CIP's like m & λ with their corresponding scale specific intrinsic-quantized magnitudes. Not only that, those photons, at least two situations below, are revealed to have different scale-specific intrinsic-quantized magnitudes in their CIP; *i.e.*, in their inertial motions v:

3.1 Inertial Motion of Gamma-Ray Photons

First, we consider the phenomenon of electron and positron pair annihilation with formation of a pair of gamma-ray photon-WCP's:

$$e^- + e^+ = \gamma_1 + \gamma_2 \tag{3}$$

where e^- & e^+ are an electron-P & a positron-P, and γ_1 & γ_2 are two gamma-ray photon-P's, respectively. If we consider that such e^- & e^+ have their corresponding inertial mass-energies as $m_{e^-} = m_{e^+}$ and wavelengths as $\lambda_{e^-} = \lambda_{e^+}$ in Eq. (2), and after their annihilation the corresponding inertial mass-energies for the newly evolved pair of γ_1 & γ_2 will obviously be as $m_{\gamma 1} = m_{\gamma 2}$, respectively. Then according to the universal laws of mass-energy and momentum conservations, we can re-write Eq. (3) as

$$m_{e^-} \times v_{e^-} + m_{e^+} \times v_{e^+} = m_{\gamma_1} \times v_{\gamma_1} + m_{\gamma_2} \times v_{\gamma_2} \quad . \tag{4}$$

There should be corresponding scale-specific intrinsic-quantized magnitudes of inertial motions for that electron-positron pair, as $v_{e^-} = v_{e^+}$. Because, conceptually we already have for both of those e^- & e^+ as $m_{e^-} = m_{e^+}$ and $\lambda_{e^-} = \lambda_{e^+}$. Since we have $m_{\gamma 1} = m_{\gamma 2}$ for the pair of same gamma-ray photons, we have for their quantized inertial motions $v_{\gamma_2} = v_{\gamma_1}$. Similarly, due to $m_{e^-} = m_{e^+}$, we have as well $m_{\gamma 1} = m_{\gamma 2}$. We can re-write Eq. (4) as

$$m_{e^-} + m_{e^+} = m_{\gamma 1} + m_{\gamma 2} \quad . \tag{5}$$

Since $m_{\gamma 1} = m_{\gamma 2}$, we must have wavelengths

$$\lambda_{\gamma_1} = \lambda_{\gamma_2} \tag{5a}$$

for those two gamma-ray photons. Then ultimately, from Eq. (3) we can re-write Eq. (5) as

$$m_{e^-} = m_{e^+} = m_{\gamma 1} = m_{\gamma 2} \tag{6}$$

and then, according to Eq. (6) we can also write from Eq. (4) that

$$m_{e^-} \times v_{e^-} = m_{e^+} \times v_{e^+} = m_{\gamma_1} \times v_{\gamma_1} = m_{\gamma_2} \times v_{\gamma_2} \tag{7}$$

where obviously we should have

$$v_{e^-} = v_{e^+} = v_{\gamma_1} = v_{\gamma_2} \tag{8}$$

for each member of the electron-positron pair (before annihilation) as well as each of the two gamma-ray-photons in the pair (after annihilation).

But according to the convention in SRT, it is expected that the inertial motions for both of the electron and positron in Eq. (8) will satisfy

$$(v_{e^-} = v_{e^+}) < c \quad . \tag{8a}$$

Then obviously in same way we should have also for the intrinsic-quantized magnitudes of two gamma-ray-photons

$$(v_{\gamma_1} = v_{\gamma_2}) < c \quad , \tag{8b}$$

In SRT, c is considered to characterize the inertial motions for all electromagnetic waves on the whole EMS, irrespective of their wavelengths. But there is a difference in magnitudes of inertial motions of gamma-ray-photons with c in Eq. (8b). Then a photon with $v_c = c$ must be a non-gamma-ray-photon. So, if we can consider that $v_c = c$ for a different scale of photons, then obviously from Eq. (1), that scale of photons will have different scale-specific intrinsic quantization in magnitudes of wavelength (say λ_c) and inertial mass (say m_c), compared to the gamma-ray-photons in Eq. (8b).

Since the photons with $v_c = c$ in SRT are considered as non-gamma-ray photons, and from Eq. (2) all gamma-ray photons are found at the highest end of the EMS for their corresponding highest magnitudes of inertial masses, we can consider that the inertial masses for the gamma-ray photons in Eq. (6) will have

$$(m_{\gamma_1} = m_{\gamma_2}) > m_c \quad . \tag{9}$$

Because we do not yet know the scale specific quantized magnitude of m_c. Similarly, for corresponding wavelengths of the same pair of gamma-ray photons, in Eq. (5a), with the help of same Eq. (2), we have

$$(\lambda_{\gamma_1} = \lambda_{\gamma_2}) < \lambda_c \quad . \tag{9a}$$

Ultimately, we can rewrite Eq. (8b) for our convenience as:

$$(v_{\gamma_1} = v_{\gamma_2}) < (v_c = c) \quad . \tag{10}$$

Now it is revealed in Eq. (10) that a specific scale of gamma-ray photon-P's shows different intrinsic-quantized magnitude in its inertial motion ($v_{\gamma_1} = v_{\gamma_2}$) compared to the 'speed of light' ($v_c = c$), if we consider the same ($v_c = c$) as another scale specific intrinsic-quantized magnitude of inertial motion for a specific scale of another photon-P's instead of all scales of photon-P's on the whole EMS. Hence, at least, due to above Eq. (10) can be assumed that there are two different intrinsic-quantized magnitudes of inertial motions (as a CIP) for two different scales of photon-P's on the EMS.

3.2 Inertial Motion of Microwave Photons

Logically we observed in Eq. (10) that c (2.9792×10^{10} cm/sec) may not always be a common inertial magnitude of speed for all scales of photons, irrespective of their wavelengths. Even in some current experiments [1], it has been claimed that some microwave photons, with their respective intrinsic-quantized magnitude of wavelength, possess intrinsic-quantized inertial speed of magnitude higher than the 'speed of light', say v_η; where obviously we can express it as $v_\eta > (v_c = c)$ and then we can re-write Eq.(10) as

$$(v_{\gamma_1} = v_{\gamma_2}) < \ldots < (v_c = c) < \ldots < v_\eta < \ldots \tag{11}$$

and obviously we can re-write the corresponding wavelength (say λ_η) of such microwave-ray-photons in Eq. (9a) as

$$\ldots\ (\lambda_{\gamma_1} = \lambda_{\gamma_2}) < \ldots < \lambda_c < \ldots < \lambda_\eta < \ldots \tag{12}$$

Also, from Eq. (2) there will be the intrinsic-quantized magnitude of inertial mass-energy (m_η) for that microwave-ray-photon as $m_\eta = (k_1 / \lambda_\eta)$ where in Eq. (9) the inertial mass-energy for the same must be ($m_c > m_\eta$), since we already have ($\lambda_\gamma < \lambda_c < \lambda_\eta$) in Eq. (12). Then we can write the above Eq. (9) as

$$(m_{\gamma_1} = m_{\gamma_2}) > \ldots > m_c > \ldots > m_\eta > \ldots \tag{13}$$

on the EMS.

4. Inertial Momentum of All Particles

From Eqs. (11-13) respect to a particular scale of photon-P (say) with its corresponding CIP's like ($v_c = c$), m_c and λ_c, we can again re-write Eq. (1) as

$$m_c \times \lambda_c = h / v_c \quad . \tag{14}$$

For a gamma-ray-photon there are

$(v_{\gamma 1} = v_{\gamma 2}) = v_\gamma < (v_c = c)$ in Eq. (10) and

$(m_{\gamma 1} = m_{\gamma 2}) = m_\gamma > m_c$ in Eq. (9), as well as

$(\lambda_{\gamma 1} = \lambda_{\gamma 2}) = \lambda_\gamma < \lambda_c$ in Eq. (9a).

Now for that gamma-ray-photon-WCP where $v_\gamma < (v_c = c)$, we can further write the above Eq. (1) as

$$m_\gamma \times \lambda_\gamma = h / v_\gamma \quad . \tag{14a}$$

We can similarly re-write Eq. (1) from the same Eqs. (11), (13) & (12) respect to a microwave-ray-photon-P with $(v_\eta > v_c = c)$, ($m_\eta < m_c$) and ($\lambda_\eta > \lambda_c$) as

$$m_\eta \times \lambda_\eta = h / v_\eta \tag{14b}$$

since, all the two scale-specific-intrinsic-quantization in magnitudes of inertial motions like $v_\gamma = (v_{\gamma 1} = v_{\gamma 2})$ and $v_\eta > (v_c = c)$ in Eq. (11) like $(v_c = c)$ are inertial motions of corresponding wavelengths λ_γ, λ_η and λ_c of photons on the same EMS.

In Eqs. (14), (14a) & (14b) it is apparent that the corresponding magnitudes of c in Eq. (1) are different respect to the different scales of photon-P's, although each of those three magnitudes of c are scale-specific-intrinsic-quantization in magnitudes of inertial motions.

However, in Eq. (1), we have already considered that both λ & m in all scales of P's from micro to macro in Nature, including photon P's on the EMS, as observer-independent SSUC's. Not only that, in Sect. 3.1 it has also considered that c is a scale-specific-intrinsic-quantization in magnitude of inertial motion for a specific scale of photons which is observer-independent SSUC. In Eqs. (12) & (13) it has also appeared that c has corresponding m_c and λ_c.

In this context, since the c in Eq. (1), has different scale-specific-intrinsic-quantization in magnitudes of inertial motions and each of which are observer-independent SSUC's in Eqs. (14), (14a) & (14b), then obviously in those same equations, the h, in Eq. (1) should possess the different corresponding scale-specific-intrinsic-quantization in magnitudes. Then we can re-write all those above Eqs. (14a), (14) & (14b) in terms of corresponding three scale-specific-intrinsic-quantization in magnitudes of h with respect to a gamma-ray-photon (say h_γ), a specific scale of photon (say h_c) and a microwave-ray-photon (say h_η) as

$$m_\gamma \times \lambda_\gamma = h_\gamma / (v_\gamma < c) \quad , \tag{15}$$

$$m_c \times \lambda_c = h_c / (v_c = c) \quad , \tag{15a}$$

$$m_\eta \times \lambda_\eta = h_\eta / (v_\eta > c) \quad . \tag{15b}$$

If all m_γ, m_c and m_η in Eq. (13), λ_γ, λ_c and λ_η in Eq. (12), and v_γ, v_c and v_η in Eqs. (14a), (14) & (14b) are considered as observer-independent SSUC's, then obviously the corresponding h_γ, h_c and h_η in Eqs. (15), (15a) & (15b) are equally observer-independent SSUC's.

Now, all the parameters in Eqs. (15), (15a) & (15b), h_γ & $(v_\gamma < c)$, h_c & $(v_c = c)$, and h_η & $(v_\eta > c)$, have their corresponding scale specific intrinsic-quantum magnitudes for three specific scales of photon-P's along with other corresponding scale specific intrinsic-quantum magnitudes (m_γ & λ_γ), (m_c & λ_c), (m_η & λ_η) on the EMS; and since each of the four parameters in all above Eqs. (15), (15a) & (15b) are observer-independent SSUC's, we can also rewrite all those same Eqs. (15), (15a) & (15b) as

$$m_\gamma (v_\gamma < c) = h_\gamma / \lambda_\gamma = k_2 \quad , \tag{16}$$

$$m_c (v_c = c) = h_c / \lambda_c = k_2 \quad , \tag{16a}$$

$$m_\eta (v_\eta > c) = h_\eta / \lambda_\eta = k_2 \quad , \tag{16b}$$

where k_2 is a new constant, and should be the UC for all scales of photon-P's on the EMS, like k_1 in Eq. (2). Then Eqs. (15), (15a) & (15b) can be rewritten in general as

$$m \times v = h / \lambda \tag{17}$$

for all scales of photon-P's on the EMS. Obviously we can also write a generalized equation of k_2 for the above Eqs. (16), (16a) & (16b) for all same scales of photon-WCP's on the EMS from Eq. (17) as

$$m \times v = h / \lambda = k_2 \quad , \tag{18}$$

and from Eq. (18) we can further write that (m & v) have an inverse relationship

$$m \propto 1 / v \quad , \tag{18a}$$

and in Eq. (18), it is apparent that different scales of photons with corresponding scale-specific-intrinsic-quantization in magnitudes of m & λ all possess corresponding scale-specific-intrinsic-quantization in magnitudes of their inertial motions v as well as h; and as a result of it all those scales of photon-P's are on the same EMS have a constant inertial-momentum; *i.e.*, k_2.

Eq. (1) as well as Eq. (2) along with the CIP's like m & λ are not only applicable to all scales of photon-P's on the EMS, but are equally applicable to the every micro and macro scale of P's in Nature. Since the k_2 in Eq. (18) is deduced basically from Eqs. (1) & (2) for all micro to macro scale of P's, then we can postulate that the same Eq. (18) is also true for all other micro to macro scales of P's in Nature. So, we can postulate that:

every micro to macro scales of P's (including all scales of photon-P's on the EMS) should have their scale-specific-intrinsic-quantization in magnitudes of inertial motions (v) as a CIP which are always observer-independent SSUC's and as a result, there will be also an outcome inertial momentum (k_2), where k_2 will be a UC irrespective of all scales of P's in Nature.

In Eq. (18), the unit for k_2 will be obviously in gm-cm/sec as units of m in gm and v in cm/sec.

5. Inertial Space and Radius: Parameters Common to All Particles

In Eqs. (2) & (18), for each scale of P's in Nature only three CIP's, like m, v & λ, are found along with their interrelationship in h, where h is basically a product of all these three CIP's in every scale of P's; and all (m, λ & v) as well as h are observer-independent SSUC's. Beside these CIP's and h, there are two UC's also in Eqs. (2) & (18) *e.g.* (k_1 & k_2) respectively which are always identical in magnitude, irrespective of the scale of P's.

Then let us find out whether, apart from these three CIP's like m, v & λ in the above Eqs. (2) & (18), there are any other CIP's along with their possible interrelationships or UC's in all those same micro to macro scales of P's in Nature.

5.1 Common Spatial Realizations

Every physical existence in Nature conceptually has some spatial extensions. Then every micro to macro scales of P's should have some spatial extension or space. Today, there are two well-accepted realizations about the space that are correlated to the all micro and macro P's in Nature as:

1) Particles with Curved and Quantized Space

It is a general convention in mechanics that, besides the three CIP's m, v & λ in Eqs. (2) & (18), there are also at least two other CIP's conceptually co-existing in all those same scales of P's: space (s) and time (t). There are three conventional, physically observable, dimensions or co-ordinates of space *i.e.* x, y & z. Practically, s is not a single CIP; rather, it is comprised of the three CIP's like 3 radii-CIP's or x, y & z CIP's. For time, there is also one conventional physical dimension or co-ordinate *i.e.* t. So the t will be a single CIP.

First we consider the space. However, it appears conceptually that, all those particles or P's are irrespective of their scales always associated with an intrinsic 'volume' due to the simultaneous co-existences of all those three spatial dimensions x, y & z of space, *i.e.* $s(x,y,z)$. So that $s(x,y,z)$, which is intrinsically occupied by all the corresponding scales of P's, should be physically 'curved'. Not only that, such 'curved' space $s(x,y,z)$ is appears too to exist in inertial states of all scales of P's.

Furthermore, in absence of any scales of P's, there will be impossible to set up any practical inertial frame reference to define any existence of $s(x,y,z)$ in Nature. Then without any existence of P's there will be no practical existence of $s(x,y,z)$. So there will be no practically definable absolute 'void' space in Nature except pre-occupied by any scales of P's.

In micro scales, it is well known that the corresponding non-void 'volume' or $s(x,y,z)$ of P's are possessed scale-specific-intrinsic-quantization in magnitudes. Since, macro scales of P's are always comprised of those micro P's, then obviously macro scales of P's should have their corresponding scale-specific-intrinsic-quantizations in magnitudes in non-void 'volumes' too. No matter whether those intrinsic quantized non-void-volumes of macro scales of P's are defined or not.

Then, for every such scale-specific-intrinsic-quantized non-void 'volume' of $s(x,y,z)$, the magnitudes of three axes x, y & z, or the radius (say r) of all scales of P's should have also scale-specific-intrinsic-quantized magnitudes.

Here it is considered that, all particles or P's, irrespective of their scales, are possessed their non-void 'volumes' in perfect spherical in shapes, so that spherical space must have always scale-specific-intrinsic-quantization in magnitude of spherical 'volume'.

2) Particles with Intrinsic Left-Handed Rotations

It is now also realized that every such scale specific P's with $s(x,y,z)$ as one of the primary-CIP's in Nature, are intrinsically left-handedly or 'clockwise' rotating [2] around their 'respective axes'. So $s(x,y,z)$ always has intrinsically left-handed, or clockwise, rotation around the axis of all respective scales of P's in Nature.

5.2 Spherical Space

The above $s(x,y,z)$ in all scales of P's in Nature is considered as a perfect sphere with scale-specific-intrinsic-quantization in magnitudes of its volume and radius. Then it can be simply defined as

$$s = 3\pi s = 3\pi r^3 / 4 \tag{19}$$

in our preceding text. In Eq. (19), since r possesses its unit in cm, then the unit of the s will be in cm³. Not only that, as both s & r in Eq. (19) are two scale-specific-intrinsic-quantization in

magnitudes of all scales of P's, then both s & r will be CIP's and observer-independent SSUC's, as like m, λ & v in Eqs. (2) & (18).

6. Anti-Space and Anti-Radius More Common Parameters

The term 'anti-space' refers to P's with an intrinsic simultaneous right-handed rotating mirror image. If we have the above intrinsic left-handedly rotating $s(x, y, z)$ in all scales of P's, then, simultaneously for the same $s(x, y, z)$ there will be a conceptual intrinsic mirror-imaged anti-space $s_u(x_u, y_u, z_u)$, and obviously such $s_u(x_u, y_u, z_u)$ should be simultaneously in its intrinsic right-handed rotations in all those same scales of P's in Nature. As we have already considered the above $s(x, y, z)$ as the perfect spheres in shape, then its simultaneous mirror-image counterpart $s_u(x_u, y_u, z_u)$ should be also in perfect spherical shape; and also both of these (s & s_u) in all P's should be mirror images of each other. That is, both s & s_u should have an inverse proportional relationship in magnitudes to each other as a perfect mirror image pair. So, the s_u is not a single CIP, rather it comprises three CIP's like 3 anti-radii-CIP's or x_u, y_u, and z_u CIP's.

That is, all scales of P's in above Eqs. (2) and (18), can be physically realized also as – (i) a product of two simultaneous mirror image CIP's, *e.g.* (s & s_u) with (ii) their scale-specific-intrinsic-quantization in magnitudes of simultaneous mirror image volumes, where (iii) both (s & s_u) are intrinsically as well as simultaneously left and right handedly (or clockwise and anti-clockwise) rotating around their respective 'axes'.

The simultaneous mirror image $s_u(x_u, y_u, z_u)$ in all scales of P's in Nature will be as

$$s_u = 3\pi s_u = 3\pi r_u^3 / 4 \tag{20}$$

for s in Eq. (19) where the s_u will have also its scale-specific-intrinsic-quantization in mirror image magnitudes for the both s_u & r_u in Eq. (20). Again as the mirror image counter part r_u for the r possesses the same kind of scale-specific-intrinsic-quantization in magnitudes, then r_u as well as s_u are also two CIP's and observer-independent SSUC's as like as s & r in Eq. (19) and m, λ & v in Eqs. (2) & (18). Similarly the unit of r_u will be in cm as its mirror image counterpart r has the unit in cm. Then the unit of s_u in Eq. (20) will be also in cm³.

6.1 Relationship between Inertial Space and Antispace

Since (r & r_u), in Eqs. (19) & (20) respectively, coexist simultaneously (as mirror images) in all scales of P's with their scale-specific-intrinsic-quantization in mirror image magnitudes, then these two CIP's should have an inverse relation as

$$r \propto 1 / r_u \quad . \tag{21}$$

Also, from Eq. (21) we must have another new UC which should have an identical magnitude in all scales of P's as we have same for the constants like k_1 in Eq. (2) & k_2 in Eq. (18) as

$$r \times r_u = k_3 \tag{22}$$

where, due to the respective units of r & r_u, the unit of k_3 will obviously be cm². Again, due to Eq. (21), we will have for s & s_u as two mirror image CIP's also from Eqs. (19) & (20) for all same scales of P's as

$$s \propto 1 / s_u \quad . \tag{23}$$

Obviously, from Eq. (23) there will be also another new UC with identical magnitude in all scales of P's as we have for k_1 in Eq. (2), k_2 in Eq. (18) and k_3 in Eq. (22) as

$$s \times s_u = k_4 \tag{24}$$

where the unit for k_4 due to the units of s in Eq. (19) and s_u in Eq. (20) will be as cm³.cm³ or as cm⁶.

7. Inertial Time and Anti-Time

It is now also a well-accepted concept in mechanics that space cannot be separated from time or *vice versa*. However, we already defined space (with its mirror image anti-space) in Eqs. (19) and (24) as one of the CIP's in all scales of P's.

7.1 Definition of Inertial Time

The magnitude of s in Eq. (19) is possessed always a scale-specific-intrinsic-quantization in magnitude of volumes in all scales of P's which are comprised the Nature. Again, concept of time is practically meaningless without realization of any existence of space in all those scales of P's in Nature or *vice versa*. That is, realization of any space, which is associated with all those P's, there should be equally a simultaneous realization of time (t) in all those same P's in Nature. Since, in Eq. (19), the s has its scale-specific-intrinsic-quantization in magnitudes in all P's, then obviously, there should be a simultaneous scale-specific-intrinsic-quantization in magnitudes for t in all those same P's in Nature.

On the other hand, as a general convention, the measurement of t in Nature is primarily nothing but a process to select an unit 'duration' which is equivalent to a corresponding unit 'distance' of movement in space in any system of time measuring object or device or clock. Now, the Nature, which is constituted by all P's irrespective of their scales and each of such P's are defined by some CIP's in Eqs. (2), (18), (22) & (24) including the concept of 'distance' or space. Since conceptually t possesses scale specific intrinsic-quantization in magnitudes, we can express the t in terms of 'space' or 'distance'. In the same Eq. (19), the s also has an intrinsic left-handed direction of rotations around the respective axis of a P. Then, we can define such t in a P as a unit 'duration' ≡ the 'equatorial distance', or 'equatorial length' per left

handed rotation of the same P around its respective axis. For conveniences, we can also imagine such 'equatorial distance', or 'equatorial length', as several units like on a clock. However, as we have scale-specific-intrinsic-quantization in magnitude of s in every scales of P, then obviously there will be also the scale-specific-intrinsic-quantization in magnitude of the 'equatorial distance or length' of that specific scale of P. The t also has similar scale-specific-intrinsic-quantization in magnitude *i.e.* 'duration'. However, in our usual convention for measurement of time, we can define t for convenience in every scales of P as an 'equatorial distance' or 'length' per left handed rotation of its s in Eq. (19)

$$t = 1 \text{ unit} = 360^{\circ} \tag{25}$$

where we have the unit of time in degrees or minutes or seconds as per conveniences. But it is also apparent in Eq. (25) that the unit of time is in angular distances along the equator of the s in P. As a result, there will be no scale-specific-intrinsic-quantization in magnitudes of t in all scales of P's where magnitudes of every unit of time ($t = 360^{\circ}$) is appeared identical to every scales of P's in Nature as the angular distance of equator for s in every scales of P's are universally identical - *i.e.* 360°. That is, the t in Eq. (25) becomes as one of the scale specific CIP in all scales of P's in Nature with no scale-specific-intrinsic-quantization in magnitudes.

But, it is also true that the s in Eq. (19) has scale-specific-intrinsic-quantization in magnitude and obviously there should be also a scale-specific-intrinsic-quantization in magnitudes for same 'equatorial distance' or 'length' for all P's in Eq. (25). Then, the t as a scale-specific-intrinsic-quantization in magnitude in Eq. (25) as an 'equatorial distance' or 'length' per left handed rotation of its s in Eq. (19)

$$t = \mathbf{1\ unit} = 2\pi r \tag{26}$$

where t appears in a non-conventional unit, in cm due to the unit of radius r. However, the t in Eqs. (25) & (26) ultimately has both conventional and non-conventional units whenever they may be needed for our particular purpose.

The t in Eqs. (25) & (26) also has a left-handed or clockwise direction for axial rotation, due to the same for the s in Eq. (19). On the other hand, as a usual convention, the same t is 'moving', *i.e.* 'flowing' clockwise from 'past' → 'future'. We can consider such a convention of clockwise flow of time t is analogous to the convention of its intrinsic clockwise axial rotations. That is, finally, the t in Eqs. (25) & (26) defines to possess the non-conventional unit (in cm) with scale-specific-intrinsic-quantization in magnitude beside its conventional unit (in sec) with clockwise (*i.e.* left handed) flow from past to future in all scales of P's in Nature.

7.2 Definition of Anti-Time

Again, logically, since we have simultaneous mirror image s_u in Eq. (20) for s in Eq. (19) as well as (r & r_u) in Eq. (22) for the all scales of P's, then we should have also the simultaneous mirror image anti-time t_u for the t in Eqs. (25) & (26) for all those same scales of P's from the mirror image right-handed axial rotations of s_u along its equator. For t in Eq. (25) we can define the conventional unit for an 'equatorial distance or length' per right handed rotation of its s_u in Eq. (20):

$$t_u = 1 \text{ unit} = 360^{\circ} \ , \tag{27}$$

where the conventional unit of t_u is degrees or minutes or seconds. But t_u in Eq. (27) has no scale-specific-intrinsic-quantization in magnitudes. There are (s_u & r_u) in Eq. (20) which are possessed their scale-specific-intrinsic-quantization in magnitudes, then, there will be also a similar scale-specific-intrinsic-quantization in magnitude of the 'equatorial distance' or 'length' of s_u. Then, for such a scale-specific-intrinsic-quantization in magnitudes of 'equatorial distance' or 'length' in all scales of P's, there will be an equatorial distance or length for right handed rotation of its s_u in Eq. (20)

$$t_u = \mathbf{1\ unit} = 2\pi r_u \tag{27a}$$

and the t_u in Eq. (27a) as like as t in Eq. (26) has the non-conventional unit in cm, due to the unit of radius r_u.

As we have the flow of t in Eq. (26) is intrinsically clockwise or 'past' →' future' along the intrinsic clockwise (*i.e.* left-handed) axial rotations of s in Eq. (19); then obviously its simultaneous mirror image t_u in Eq. (27a) should have the simultaneous mirror image opposite flow, *i.e.* anti-clockwise or 'past' ← 'future' along the intrinsic anti-clockwise (*i.e.* right-handed) axial rotations of s_u in Eq. (20).

This simultaneous opposite flow of t_u can be experienced, conceptually, during transformation of any 'physical event' in between a sender and a receiver. For example, A and B are such sender and receiver respectively; and an event is transforming from A to B through a signal-P, say, the Q with another specific scale. Suppose the Q has started from A at a moment of time say t_A in past and has reached to B at a moment of time say t_B in future. Then B, by receiving the Q at t_B, became aware that the Q has traveled through space for the duration of time say $\Delta t = (t_B - t_A)$ from 'past' → 'future'. But, simultaneously, through receiving the same Q, the same receiver B is also realizing the past era (t_A) of time from his era of time in future (t_B), or as if he is feeling to reach simultaneously at that past era by moving from the future to past or ('past ← future'). Hence, in every transformations of physical events through any Q, there is always a simultaneous flow of anti-time $\Delta t_u = (t_A - t_B)$ in reverse direction of above $\Delta t = (t_B - t_A)$. The flows of simultaneous (Δt & Δt_u) are always realized during every astronomical observation through receiving the photon-signal (or Q). More and more one receives Q from the distant 'pasts'; *i.e.* also from the 'distances' in space, one can simultaneously reach to the more

and more distant 'pasts'. This can be imagined as if both (t & t_u) are flowing through that photon-signal-Q as specific scale of P.

7.3 The Next Universal Constant

Since t in Eq. (26) & t_u in Eq. (27a) are considered as two simultaneous mirror image common parameters with their scale-specific-intrinsic-quantization in magnitudes due to the presence of (r & r_u) in Eq. (22) as well as (s & s_u) in Eq. (24) , then obviously, there will be an inverse relationship in between such pair of (t & t_u) as

$$t \propto 1/t_u \tag{28}$$

and from the Eq. (28) there will be another new UC with an identical magnitude in all scales of P's in Nature, like as k_1 in Eq. (2), k_2 in Eq. (18), k_3 in Eq. (22) and k_4 in Eq. (24) as

$$t \times t_u = k_5 \tag{29}$$

where the unit of the k_5 will be either cm² due to the units of r in Eq. (26) and r_u in Eq. (27a), or the same may also have in sec² in Eqs. (25) & (27). As (s & r) in Eq. (19) and (s_u & r_u) in Eq. (20) are observer independent SSUC's, then t in Eq. (26) and t_u in Eq. (27a) will be also two observer independent SSUC's (as two CIP's) in all scales of P's in Nature.

8. The Real Count of Common-Parameters

We have now found very many quantized Common-Parameters or CIP's in all scales of P's in Nature. There are three CIP's in Eqs. (2) & (18), namely m (1), λ (1) & v (1), are interrelated in all same P's. There are also ten other CIP's: s (3), r (1), s_u (3), r_u (1), t (1) & t_u (1) in Eqs. (19), (20), (22) (24), (26), (27a) & (29) respectively.

Some of the CIP's in both the lists are common to all same P's in Nature. Some may be similar, or identical. To obtain the actual number of unique CIP's, we have to sort out redundant CIP's, if there are any, in all scales of P's in Nature.

8.1 Anti-Radius and de Broglie Wavelength Equivalent

Among all of the CIP's (m, λ & v) and (s, r, s_u, r_u t & t_u), there are (r_u & λ), which seem equivalent in every scale of P's, although r_u appears as an anti-radius, while λ is a wavelength in the same P's. But in Eq. (22), the r_u is in units of cm, and appeared as one of the CIP's with scale-specific-intrinsic-quantization in magnitudes which is simultaneously existing with r in all scales of P's in Nature; and the r_u has also an inverse relationship with the r. Equally, in Eq. (2), the λ has also unit in cm and also appeared as one of the CIP's too with scale-specific-intrinsic-quantization in magnitudes which is also simultaneously existing with r in Eq. (22) or (19) or (26) in all scales of P's in Nature; and the λ has also a conceptual inverse relationship with the same r in Eq. (22) due to Eqs. (19), (18) and (26). So we can postulate that in Eq. (22):

> *The anti-radius (r_u) in Eq. (22) as a CIP is equivalent as well as equal in measurement to the de Broglie's wavelength (λ) in Eq. (2) as a CIP in all micro to macro scales of P's in Nature, i.e.*

$$r_u = \lambda \quad . \tag{30}$$

Then we can re-write the above Eqs. (20), (21), (22) & (27a) by replacing r_u by λ, or vice versa, to rewrite Eqs. (1), (2), (9a), (12), (14), (14a), (14b), (15), (15a), (15b), (16), (16a), (16b), (17) & (18) by replacing λ by r_u. As a result, for Eq. (30), there will be a total of 12 CIP's: m (1), v (1), s (3), s_u (3), t (1), t_u (1), r (1) and $r_u = \lambda$ (1) in all scales of P's in Nature.

Again, the respective radii of two left and right handed spheres, r & $r_u = \lambda$, as CIP's too, are always common in all three $s(x, y, z)$ CIP's and three $s_u(x_u, y_u, z_u)$ CIP's in all scales of P's. So, finally we will have the total ten numbers of CIPs: 1 for m, 1 for v, 3 for s, 3 for s_u, 1 for t, 1 for t_u in all scales of same P's in Nature.

8.2 Inertial Motion and Inertial-Radius: Inverses

Now due to Eq. (30), from above Eqs. (2), (18) & (22) there will be another new UC for the factor

$$(k_2 \times k_3)/k_1 = v \times r = k_6 \tag{31}$$

and where k_6 will be identical in magnitude in all scales of P's, like k_1 in Eq. (2), k_2 in Eq. (18), k_3 in Eq. (22), k_4 in Eq. (24) and k_5 in Eq. (29). Then the units for k_6 will be from the units of v in Eq. (18) and r in Eq. (22) cm².sec⁻¹, or in simply cm².cm⁻¹ = cm. Eq. (31) shows that there is an inverse relationship between CIP's:

$$v \propto 1/r \quad . \tag{32}$$

And from Eqs. (2), (31) & (22), we can also derive Eq.(18) with the help of Eq. (30) as

$$m \times v = (k_1/\lambda) \times (k_6/r) = (k_1 \times k_6)/k_3 = k_2 \quad . \tag{33}$$

9. Two Mirror-Image Sets of Common Parameters

9.1 Inertial Mass and Inertial Motion

In Eq. (22) through Eq. (30), the (r & λ), as CIP's, are mirror image pairs in every P, irrespective of scale. Again, the ($v \cdot r$) in Eq. (31) and the ($m \cdot \lambda$) in Eq. (2) in the same P, since (r & λ) are a mirror image pair, and in Eq. (18) the (m & v) have inverse relation, then (m & v) will also be a mirror image pair in the P. Because, v is inertial motion of P with intrinsic right

handed scale specific increments, then its mirror image counterpart m as inertial mass of P to be considered as an inertial 'resistance' to v with an intrinsic left handed increments, and vice versa.

9.2 Inertial Space and Inertial Anti-Space

Since in Eq. (22), the CIP's like (r & λ) are through Eq. (30) mirror image pairs, as well as the corresponding radii of CIP's like (s & s_u) in Eq. (24) through Eqs. (19) & (20) respectively, both (s & s_u) in all scales of P's will be a mirror image pair.

9.3 Inertial Time and Inertial Anti-Time

In the same Eq. (22), as the CIP's like (r & λ) through Eq. (30) are mirror image pair, and the radii of the CIPs like (t & t_u) in Eq. (29) through Eqs. (28) & (27a) respectively, both (t & t_u) in all scales of P's in Nature will be also another mirror image pair.

Then finally, we will have broadly three mirror image pairs of CIP's: inertial mass & motion, inertial space & antispace and inertial time & antitime, *i.e.* (m & v), (s & s_u) and (t & t_u) respectively for all scales of P's, while (r & λ) also as another mirror image pair can be excluded from the list because both are merely as radii and are common in pairs like (s & s_u) and (t & t_u). In each of those three pairs of CIP's, one is intrinsically left handed, and the other is right handed.

Then, we can broadly include each of those three pairs into two broader left-handed and right-handed mirror imaged sets as (m, s, t) and (v, s_u, t_u) respectively. Then, we can also imagine these two-mirror-imaged broader sets of CIP's as two simultaneously rotating left and right handed mirror-imaged-spheres that co-exist in every scale of P's in Nature.

10. Consequences

10.1 A Single Expression for All Particles

All P's irrespective of their scales are ultimately presented as mirror image pair of sets of intrinsic left and right handed CIP's. And then, from both of those two sets, and the P's, irrespective of scales are looked ultimately as a product of two mirror image sets, and we can define broadly a P from Eqs. (33), (24) & (29). Then ultimately a P can be defined as

$$(s \times t \times m) \times (s_u \times t_u \times v) = (k_2 \times k_4 \times k_5) = k \qquad (34)$$

where for that ultimate UC; *i.e.*, k will have units obviously in gm[1]-cm[9]/sec, and such magnitude of k should be universally identical for all scales of P's in Nature, where Eq. (34) is actually a universally common expression for all P's due to

$$(s \times t \times m) \propto 1/(s_u \times t_u \times v) \quad . \qquad (35)$$

That is, for all specific scales of P's as we define in Eq. (34), it will be always a universal constant product; *i.e.* k of two mirror image left and right handed pair of spheres or mirror image five left handed and five right handed CIP's. The left-handed sphere is comprised of five CIP's; *e.g.* for inertial-space $s(3)$, for inertial time $t(1)$ & for inertial mass $m(1)$. Simultaneously, the right-handed sphere is comprised by a further five CIP's; *e.g.* for inertial antispace $s_u(3)$, inertial anti-time $t_u(1)$ & inertial motion $v(1)$.

10.2 Other Consequences

Besides the above outcome common definition for all scale of P's, there will be other consequences for both micro and macro areas of Nature:

1) All Nature Should Be Discrete but Deterministic.

Through Eq. (18) as well as Eq. (2), all 'observers', in their respective inertial frames of reference in Nature, can measure accurately and almost simultaneously all other intrinsic-quantized magnitudes of CIP's out of all (m, λ, v & h) in every scales of P's, if all those observers can define the scale specific intrinsic-quantized magnitudes of at least any one of those CIP's. For example, the simultaneous 'position' and 'inertial mass-energy' for a P can be known through k_1 in Eq. (2) and k_2 in Eq. (18), if we define any one of its CIP's like: (m or v or λ or h) for that P through any direct observations or measurements. Suppose, if m is known, then its simultaneous intrinsic-quantized magnitudes of ($v = k_2 / m$) in Eq. (18) and ($\lambda = k_1 / m$) in Eq. (2) & ($h = k_2 / \lambda$) in Eq. (18) can be defined. Again, from the known magnitude of v, the 'position' of that particular P with m at any given moment of 'time' can be calculated. Hence there will be also no 'uncertainty' or 'indeterminism' in measurements of simultaneous 'position' and 'mass-energy' for all 'discrete' P's. If 'time' $t = (c/\lambda)$ and 'energy' is $E = mc^2 = h \cdot c/\lambda$, and if magnitude of any one CIP's out of the (m, $v = c$, h & λ) is known, then all the simultaneous magnitudes for both (t & E) of the same P's can be obtained. For example, if ($v = c$) is known for a P, then from Eq. (18) we have $m = k_2/(v = c)$, and from Eq. (2) we have $\lambda = k_1 / m$, and obviously $E = m \cdot (c = v)^2 = h(c = v)/\lambda$, as well as $t = (c = v)/\lambda$; and from the both k_1 in Eq. (2) and k_2 in Eq. (18) we can define all other non-definable CIP's simultaneously in the same P. So there will be no 'uncertainty' or 'indeterminism' in simultaneous measurements of 'time' and 'energy' in all discrete, or intrinsically-quantized, scales of P's in Nature. That is, the whole Nature, which is conceptually comprised of all such scales of discrete and deterministic P's, ultimately appear not only as *discrete* but simultaneously as a *deterministic also*.

2) Plank's Constant *h* is a Local Constant.

As shown in Eqs. (17) & (18) through Eqs. (16) – (16b), h is a product of three CIPs (m, v & λ), and all of those CIP's are observer independent SSUC in all scales of P's in Nature. Then, obviously h is in those equations will be an observer independent SSUC for all scales of P's in Nature. That is, h is a local constant.

3) Special Relativity Equations Are Local.

We have $v_c = c$ in Eq. (11), which appeared as inertial motion of a scale of photons that are non-gamma ray and non-micro

wave on the EMS, and if we consider that $v_c = c$, as a CIP for a visible light-ray-photon-P in SRT. Not only that, the $v_c = c$ is actually appeared as a *local* or an observer-independent *SSUC* only respect to that visible light-ray-photon-P with CIP's like : λ_c, m_c, h_c, *etc*. Hence any set of SRT equations which are derived respect to such $v = c$ should be also appeared as a specific scale or local rather than universally common to all scales of P's. As we have in Eqs. (17) & (18) the ($v = c$) is one of the CIP in all scales of P's in Nature, then obviously for all those scales of P's there should be corresponding set of SRT relations

$$E = m_0 \cdot (v = c)^2 \quad , \tag{36}$$

$$m^* = m_0 \Big/ \sqrt{(1 - v^*)^2 / (v = c)^2} \quad , \tag{36a}$$

$$t^* = t_0 \cdot \sqrt{(1 - v^*)^2 / (v = c)^2} \quad , \tag{36b}$$

$$s^* = s_0 \cdot \sqrt{(1 - v^*)^2 / (v = c)^2} \quad . \tag{36c}$$

where (m^*, t^*, s^* and v^*) are corresponding increments or decrements of the mass-energy, time, space and speeds for any specific scale of P in any inertial frame of reference and (m_0, t_0 & s_0) are corresponding initial mass-energy, time and space. So, for the ($v_\gamma < c$) in Eq. (16), ($v_c = c$) in Eq. (16a) and ($v_\eta > c$) in (16b) there should automatically be three corresponding sets of SRT Eqs. (36)-(36c) with respect to ($v_\gamma < c$), ($v_c = c$) and ($v_\eta > c$).

Using different intrinsic scale specific universal constant magnitudes for ($v = c$), in Eqs. (17) and (18), as well as in Eqs. (16), (16a) & (16b), any 'same event' in Nature can then be defined through each of those localized sets of SRT equations, showing their different corresponding magnitudes or localized magnitudes for that 'same event'. So, there should be corresponding localized sets of SRT equations for every specific scale of P's in Nature. Hence, through the same Eq. (18), all those same local or scale specific sets of SRT Eqs. (36)-(36c) can be universalized by the factor $v = (k_2 / m)$ instead of c as

$$E = m_0 (k_2 / m)^2 = m_0 (h / m\lambda)^2 = m_0 (k_2 / m)^2 \tag{37}$$

$$m^* = m_0 \Big/ \sqrt{(1 - v^*)^2 \big/ (k_2 / m)^2} = m_0 \Big/ \sqrt{(1 - v^*)^2 \big/ (h / m\lambda)^2} \tag{37a}$$

$$t^* = t_0 \times \sqrt{(1 - v^*)^2 \big/ (k_2 / m)^2} = t_0 \times \sqrt{(1 - v^*)^2 \big/ (h / m\lambda)^2} \tag{37b}$$

$$s^* = s_0 \times \sqrt{(1 - v^*)^2 \big/ (k_2 / m)^2} = s_0 \times \sqrt{(1 - v^*)^2 \big/ (h / m\lambda)^2} \tag{37c}$$

where the set of SRT Eqs. (37)-(37c) is universally common or identical to all scales of P's in Nature through which every event will be identical to all scales of observers (P's).

4) Inertial Motions of Some Particles have Superluminal Speeds.

Eq. (11) has shown there are various magnitudes of inertial motions for the corresponding scales of photon-WCP's in Nature instead of only c; where some scales of photons have inertial motions lower than c (*e.g.* gamma-ray photons) and some others have even higher than c (*e.g.* microwave photons). Also we found in Eq.(11), each of those different scale specific magnitudes of inertial motions, as CIP's of photon-P's , are SSUC's such as c in SRT. So each of those different scale specific inertial motions of photons must be considered as similar kind of SRT constants as like c but with different scale specific magnitudes. On other hand, it is also one of very well known conventions in any set of SRT Eqs.(36)-(36c) respect to inertial motion c of photons, there will be no superluminal speeds $c < v$ in Nature with non-negative values in their travelling times.

However, we can replace the SRT constant $v_c = c$ in Eqs. (36)-(36c) by a similar SRT constant say v_γ where ($v_\gamma < c$) and we may obtain there another set of SRT equations unlike Eqs. (36)-(36c), but through such new set of equations we will see that in the same Nature there is a highest limit of motion equal to v_γ. That is, in the same Nature, through that particular SRT set of equations respect to v_γ, we cannot even conclude about the existence of c with its non-negative travelling time. Conversely, if we replace $v_c = c$ in the Eqs.(36)-(36c) by another SRT constant v_η where ($c < v_\eta$), the same Nature alternatively appeared to us with highest limit of motion equal to v_η. But through such a set of SRT equations respect to v_η, we will see some obvious existence of superluminal speeds with non-negative travelling times of some photon-particles with inertial motions greater than c but less than or equal to v_η in same Nature ; earlier which are not definable in Eqs.(36)-(36c) respect to v_γ or c. However, the Eq.(18) does not suggest that the m_η for the specific scale of microwave photons are possessed the smallest limit of magnitude for inertial mass and inversely its v_η may possesses the corresponding highest limit of magnitude for the inertial motion in Nature. So there may be also other scales of particles in Nature which may have smaller magnitudes of corresponding inertial masses with corresponding higher magnitudes of de Broglie wavelengths in Eq. (2) and inertial motions in Eq. (18) than such micro wave photons.

Then, as a general principle, if we have any specific set of SRT Eqs. (37)-(37c) with respect to any specific scales of P's with scale specific magnitudes of inertial mass-energy m where $m < m_c$, in Eq. (13), we can definitely obtain superluminal motions in same Nature with non-negative traveling time through the generalized SRT principles.

5) Nature is 5+5 Unfolded & Mirror-Imaged Dimension.

In the same Eqs. (34) & (35) it is also apparent that any scale of P in Nature (or all Nature itself) is physically defined as 'unfolded' (5+5) simultaneous 10-CIP's. All those 10-CIP's that are

included in two mirror image sets are possessed of respective scale-specific-intrinsic-quantization in magnitudes in all P's. Since all those (5+5) 10-CIPs are defined every P's in a common definition or expression in Eq. (34), we can call each of those (5+5) 10-CIP's as (5+5) 10-dimensions. Then all single P's, irrespective of scale, as well as the whole Nature comprised of all those P's, will ultimately be mirror-image (5+5) 'physical' 10-dimensional, as all those (5+5) dimensions are physically definable. However, all those (5+5) physically observable or realizable dimensions in P's in terms of their above units will be in: gm^1. (cm^1/sec)-sec^2-cm^6, or gm-cm^9/ sec.

Again, we have in the Eqs. (2) and (18) for all the three CIP's: (m, v & λ) in all scales of P's in Nature are deterministic as well as discrete. Then obviously in Eq. (34), through all the above Eqs. (2), (18), (19), (20), (22), (24), (26), (27a), (29), (30), (31) & (33) each of those (5+5) mirror image CIP's like (m, v, s, s_u, t & t_u) including (r & $r_u \equiv \lambda$) in Eq.(30) in every scale of P's in Nature must be always deterministic as well as discrete and, if scale-specific-intrinsic-quantization in magnitudes of any one CIP out of the total (5+5) mirror image CIP's will be known, then magnitudes for rest of the CIP's can also be known almost simultaneously. For example, if we able to define through experiments, say the magnitude of m_1 for a signal-P (or Q) which is suppose transmitted from a sender-P with a scale-specific-intrinsic-quantization in magnitudes of mass say m, then after sending that particular Q, the scale-specific-intrinsic-quantization in magnitudes of inertial-mass for the sender-P becomes as $m^* = (m - m_1)$. Then from Eq.(18) we can instantaneously define its all changed scale-specific-intrinsic-quantization in magnitudes of inertial-motion, say $v^* = k_2 / m^*$ and from Eq .(2) its $\lambda^* = k_1 / m^*$ as well as from Eq. (31) its $r^* = k_6 / v^*$. Then, we must calculate equally all other changed scale-specific-intrinsic-quantization in magnitudes for its other CIP's: from Eq. (19) $s^* = 3\pi \cdot (r^*)^3 / 4$; from Eq. (20) $s_u^* = 3\pi \cdot (\lambda^*)^3 / 4$; from Eq. (26) there will be for $t^* = 2\pi \cdot r^*$ and from Eq. (27) for $t_u^* = 2\pi \cdot \lambda^*$. That is, the whole Nature is mirror image (5+5) 10-dimensional as well as discrete but deterministic.

11. Magnitudes of Universal Constants

11.1 The Magnitude of k_1

In Eq. (2) , it will be approximately equal to 2.2099×10^{-37} gm.cm , if we consider the magnitude of $h = 6.6252 \times 10^{-27}$ erg/sec or gm.cm^2/sec, and $c = 2.99792 \times 10^{10}$ cm/sec.

11.2 The Magnitude of k_2

If the magnitude of $v = v_c = c = 2.9792 \times 10^{10}$ cm/sec in Eq. (14a) and λ_c is a mean wave length of the white-light-ray-photon-WCP on the VIBGYOR spectrum of visible light equals to $\lambda_c = 5.85 \times 10^{-5}$ cm for the ($c_1 > c > c_2$), where c_1 and c_2 are considered for two most red and violet ends of wavelengths respectively, then in Eq. (18) or in Eq. (33) there will be $k_2 = m \cdot v = m_c \cdot (v_c = c) = (k_1 / \lambda_c) \cdot c =$ $1.1254246 \times 10^{-22}$ gm-cm/sec.

11.3 The Magnitude of k_3

If the scale specific intrinsic-quantized magnitude for radius of a normal hydrogen atom in its ground state of energy of the orbiting electron is approximately considered as $r_{\mathrm{H}} = r =$ $5.2917720859 \times 10^{-13}$ cm, and the magnitude of its de Broglie's wave length $\lambda_{\mathrm{H}} = 1.3232934 \times 10^{-13}$ cm, considering from Eq. (22) if the mass-energy of that hydrogen atom is $m_{\mathrm{H}} = 1.67 \times 10^{-24}$ gm; then in Eq. (22)

$$\begin{aligned} k_3 &= r \cdot r_{\mathrm{u}} \equiv \lambda r = r_{\mathrm{H}}\lambda_{\mathrm{H}} \\ &= 5.2917720859 \times 10^{-13}\mathrm{cm} \times 1.3232934 \times 10^{-13}\mathrm{cm} \\ &= 7.0025671 \times 10^{-26}\mathrm{cm}^2 \quad . \end{aligned}$$

11.4 The Magnitude of k_4

From Eq. (19) we can write $s_{\mathrm{H}} =$ volume for a normal hydrogen atom in ground state of mass-energy = $(3\pi \times r_{\mathrm{H}}^3) / 4 =$ $3.49292513 \times 10^{-37}$ cm^3, and similarly in Eq. (20) $s_{\mathrm{uH}} =$ anti-volume for the same hydrogen atom in same ground state of mass-energy = $(3\pi \times r_{\mathrm{uH}}^3) / 4 = 7.22787262 \times 10^{-39}$ cm^3. Then in Eq. (24) we should have $k_4 = s_{\mathrm{H}} \times s_{u\mathrm{H}} = 1.31892695 \times 10^{-79}$ cm^6.

11.5 The Magnitude of k_5

In Eq. (26), if the radius r for a normal hydrogen atom in ground state of mass-energy, say $r_{\mathrm{H}} = 5.291772085 \times 10^{-13}$ cm, then its corresponding time scale t for the same will be, say, $t_{\mathrm{H}} = 2\pi$. $r_{\mathrm{H}} = 3.32625668 \times 10^{-14}$ cm; and in Eq. (27a), if the respective anti-radius = de Broglie wavelength λ for that normal hydrogen atom, say $\lambda_{\mathrm{H}} = 1.3232934 \times 10^{-13}$ cm for the same hydrogen atom in ground state of mass-energy, then its anti-time scale $t_{\mathrm{uH}} =$ $2\pi r_{\mathrm{uH}} \equiv 2\pi\lambda_{\mathrm{H}} = 4.15873543 \times 10^{-13}$ cm. Hence, in Eq. (29), $k_5 = (t_{\mathrm{H}} \times t_{\mathrm{uH}}) = 1.38330215 \times 10^{-28}$ cm^2.

11.6 The Magnitude of k_6

Since in Eq. (31) we have $k_2 k_3 / k_1 = k_6$, then from the known magnitudes of k_1, k_2, k_3 we can calculate

$$k_6 = 3.56616194 \times 10^{-33}\ \mathrm{cm^2/sec} \quad .$$

11.7 The Magnitude of k

Now from all the above approximate magnitudes of k_2 in Sect. 11.2, k_4 in Sect. 11.4, and k_5 in Sect. 11.5, we have finally in Eq. (34) the approximate magnitude for

$$k = 2.05331 \times 10^{-129}\ \mathrm{gm\text{-}cm^9/sec} \quad .$$

12. Inferences

1) h has the Scale-Specific Universal Constant Magnitudes.

In Eqs. (2) & (18) as well as in Eqs. (15), (15a) & (15b) the h appears as an observer-independent SSUC. That is, the h is scale-specific-intrinsic-quantization in magnitudes correspond to every scales of P's in Nature like various CIP's like: ($c = v_c$), ($m = m_c$) and ($\lambda = \lambda_c$) in those same equations. On the other hand, the corresponding constants k_1, k_2, k_3, k_4, k_5, k_6 and k are revealed as UC's with identical magnitudes in every scale of P's in Nature.

2) Space and Anti-Space Are Considered as Perfect Spheres.

The s as a CIP in Eq. (19) is considered as perfect spheres in all scales of P's in Nature. As a result, its simultaneous mirror image counter part s_u is also considered as a perfect sphere too. However, in practical purposes both (s & s_u) may not always be the perfect spheres in every scale of P's in Nature.

3) Time and Anti-Time Have Non-Conventional Units.

Due to the scale specific intrinsic-quantized magnitudes of v in Eqs. (18) & (33), and also r in Eq. (31), the t in Eq. (26) has revealed that time possesses its scale specific intrinsic-quantized magnitudes in all scales of P's, besides a universal non-quantized sense of time in every scale of P's in Nature. As a result, the t_u, *i.e.* the anti-time, also appears to possess a scale specific intrinsic-quantized magnitudes in all corresponding scales of P's beside an universal non-quantized sense of anti-time in every scale of P's in Nature. Such *scale specific intrinsic quantized magnitudes* of both (t & t_u) can be defined only through the corresponding Eqs. (26) and (27a); and so they will have the non-conventional units cm, instead of the conventional units sec. So it may depend on the purpose of an observer whether his unit of time and anti-time will be in scale specific intrinsic-quantized magnitudes to be counted in non-conventional unit of cm or it will be in usual conventional unit of sec.

4) The Magnitudes for All k_1 – k_6 and k, Irrespective of Specific Scales of Particles, Are Approximated.

In Sect. 11, all the corresponding magnitudes of constants (k_1, k_2, k_3, k_4, k_5, k_6 and k) are defined indirectly with the help of some approximate scale-specific-intrinsic-quantization in magnitudes of few CIP's are known for various scales of P's in Nature like: h_c, ($c = v_c$) & λ_c in Eq. (15a) and also λ_H, m_H and r_H for a hydrogen atom in its ground state of mass-energy. Hence all magnitudes for UC's like: k_1, k_2, k_3, k_4, k_5, k_6 and k in their respective Sects. 11.1 to 11.7, are approximate to a certain extent.

5) There is a Definition of a Particle, Irrespective of Scales.

As we define in Eq. (34), P will always be a universally common product (*i.e.* k) of two conceptual mirror-image spheres, left-handed and right-handed, or sets with five left-handed and five right-handed CIP's. The left-handed sphere is comprised by five CIP's or dimensions like $s(3)$, $t(1)$ & $m(1)$. Simultaneously, the right-handed sphere is comprised by another five CIP's or dimensions like $s_u(3)$, $t_u(1)$ & $v(1)$.

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Situation Report **-** **continued from page 62**

The Bhunia paper starting on page 63 is certainly ambitious. He considers systems on every scale. He would appreciate the long suspected, but yet to be fully articulated, relationship between electromagnetic interactions involving micro-charges and gravitational interactions involving macro-masses - stars, and even galaxies. I think that these things are indeed not just similar, but rather that they are in fact *identical*. For example, a fuller development of electrodynamics *does* explain Planck's quantum constant h, and it *should* also explain Newton's gravitational constant G. The latter is my current work challenge.

What about motion? Is that quantized? If we speak of photons, then, yes, speed is quantized to exactly one measurable value, c. And if we speak of motion of one particle with respect to another particle in a stable bound system, then, yes, the motion is quantized in atoms, and is probably quantized in all bound particle systems.

That brings me to the subject matter of the Souris paper, starting on page 75. He is dealing with a two-body system with three kinds of interactions, two attractive and one repulsive. All of them involve the gravitational constant G, suggesting a profound connection between processes at a macro, galactic scale and a micro-micro, nuclear scale.

Would a fuller development of electrodynamics help simplify things in this domain too? One thing we find in electrodynamics is that, if we set aside the questionable c speed limit, then the same two particles can exhibit either attraction or repulsion, depending on speeds. So fewer different potentials may suffice.

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